

## II. REMARKS

### Preliminary Remarks

Upon entry of this Amendment, claims 1 to 20 will be pending, of which claim 1 is independent. Claims 1, 2, 4 to 13 are amended, and claims 14 and 20 are new. Support for the claim amendments and the new claims can be found in the specification and claims as filed (see, for example, original claims 1 to 13). Therefore, the applicants believe that no new matter is added.

Claims 2 and 3 were objected to because of alleged informalities pertaining to the expression of ratios. The examiner referenced only the informalities in claim 2, and accordingly claim 2 is amended to correct said informalities. As a result of this amendment, the applicants believe that the objection to claim 2 is moot and respectfully request withdrawal of this objection.

Claim 3 does not express any ratios, and the examiner did not specifically reference any informalities in claim 3. Consequently, the objection to claim 3 is respectfully traversed and applicants respectfully request withdrawal of this objection.

This response is filed within the statutory period for response and is accompanied by a petition for a one-month extension of time and a PTO-2038 Form for the extension of time fee. The applicants respectfully request reconsideration and allowance of the present application.

### Patentability Remarks

#### *Rejections under 35 U.S.C. §112 –*

Claims 1 to 13 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The applicants respectfully traverse in view of the preceding claim amendments and succeeding remarks:

- Claim 1 is amended to remove commas between the individual recitations of R' and R elements (*i.e.*, the molecular unit structures), and alternative embodiments of said molecular unit structures are indicated by the term "or". Similarly, the recitations "n0

is equal to 0,1" and "R,R" are replaced with language that more clearly expresses the claimed invention.

- Claim 1 is amended to remove the term "when possible" in line 15. Similarly, the phrase "preferably from 60°C to 130°C" is deleted from line 7 of claim 1, and new claim 14 is added to express the said subject matter.
- Claim 1 is amended so that alternative embodiments of R<sub>f</sub> are delineated by the term "or."
- The Markush groups of claims 1, 6 to 10, and 12 are amended to the proper format. The applicants note that claim 11 does not recite any Markush group, and respectfully traverse the examiner's rejection of this claim.

The applicants respectfully submit that these claim amendments and remarks render the rejections under 35 U.S.C. §112, second paragraph, moot and request their withdrawal.

*Rejection under 35 U.S.C. §101 –*

Claim 13 was rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. The applicants respectfully traverse in view of the preceding claim amendments and succeeding remarks.

Claim 13 is amended so that it no longer claims the recitation of a use, but now claims a method. Moreover, new claim 20, which further limits said method of claim 13, is added. The applicants respectfully submit that these claim amendments and remarks render the rejection under 35 U.S.C. §101 moot and request its withdrawal.

*Rejections under 35 U.S.C. §103 –*

Claims 1 to 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kruecke *et al.* (U.S. Pat. No. 6,080,799) in view of Moore *et al.* (U.S. Pat. No. 5,658,962). The applicants respectfully traverse in view of the preceding claim amendments and succeeding remarks.

It is known in the prior art that one can obtain stiff polyurethane foams having a closed cell structure with high thermoinsulating performances by using HFC 141b-based formulations, or by using cheap but flammable foaming agents such as pentanes.

However, the latter set of compounds result in stiff polyurethanes foams having worse performances than those obtained with HFC 141b-based formulations. It is also known in the literature, that HFC 365mfc is a drop-in substitute of HFC 141b. However the thermoinsulating properties of the thus obtained polymeric foams are not satisfactory.

The present invention is directed to mixtures comprising HFC 365mfc, used in substitution of HFC 141b, to obtain polymeric foams having thermoinsulating properties, in particular thermal conductivity, which are substantially maintained over time (see page 4, lines 17 to 22 of the specification as filed). This technical problem is solved by using a mixture of HFC 365mfc and hydrofluoroethers of formula (I) having boiling points from 50°C to 150°C.

Examples 2 to 6 refer to polyurethane foams obtained with the fluid compositions according to the present invention (see pages 18 to 19 of the specification as filed). By using the scanning electron microscopy (SEM) method to determine cell size, it was found that cell sizes of the polyurethane foams according to the present invention are substantially the same as those foams obtained by using HFC 365mfc alone (the SEM method is described on page 17, lines 1 to 9 of the specification as filed). Therefore, the hydrofluoroethers of formula (I) are chemically inert compounds in the foam preparation process, and as such are neither foaming agents nor cell size modifiers (see page 13, line 14 of the specification as filed).

Comparative example 7 describes an experiment wherein an attempt was made to prepare polyurethane foams by using only the hydrofluoroethers of formula (I) and no HFC 365mfc (see pages 19 to 20 of the specification as filed). No foams were obtained. This shows that the hydrofluoroethers having boiling points from 50°C to 150°C are not foaming agents when used to prepare foams in an admixture with HFC 365mfc.

Comparative example 8 shows that the fluid mixtures according to claim 1 are not azeotropic mixtures (see page 20 of the specification as filed). Comparative example 9 shows that by using hydrofluoroethers with a boiling point higher than 150°C a non-homogeneous foam is obtained (see page 20 to 21 of the specification as filed).

In addition to the aforementioned experimental results, applicants note that by using fluid mixtures of HFC 365mfc and hydrofluoroethers having boiling points from 30°C to 40°C, it is possible to obtain polyurethane foams, but they do not maintain thermoinsulating properties over time (see page 14, lines 12 to 16 of the specification as filed). Therefore the above examples show that it is the combination of HFC 365mfc with hydrofluoroethers of formula (I) having boiling points from 50°C to 150°C which solves the technical problem of the present invention.

Kruecke *et al.* solve the technical problem of providing a method that enables foamed plastics to be manufactured with simpler processing, and making available compositions that do not have a flash point and with which foamed plastics, with advantageous properties, could be produced in a simple manner (see column 1, lines 44 to 51). Kruecke *et al.* solve the technical problem by disclosing mixtures consisting of 50 to 99% by weight of HFC 365mfc and 1 to 50% by weight of at least one fluorinated hydrocarbon selected from the group consisting of 1,1,1,2-tetrafluoroethane (R 134a), 1,1,1,3,3-pentafluoroethane, 1,1,1,3,3,3-hexafluoroethane and 1,1,1,2,3,3,3-heptafluoroethane (R 227ea) (see column 1, lines 54 to 60). Kruecke *et al.* state that such fluorinated hydrocarbons are known in the prior art as components of blowing agents (see column 1, lines 32 to 36). Similarly, Kruecke *et al.* state that their inventive mixtures are components of blowing agents (see column 3, lines 44 to 49 and claim 15).

Moore *et al.* disclose omega-hydrofluoroethers, their preparation and their applications. Moore *et al.* state that omega-hydrofluoroether compositions are useful for cleaning and drying applications (column 13, lines 38 to 40), as heat transfer agents or coolants, blowing agents, cell size regulators in making polyurethane foam insulation, or chemical fire extinguishing agents or as lubricants for magnetic recording media (column 13, lines 45 to 52).

There is no suggestion or motivation to combine Kruecke *et al.* with Moore *et al.* On page 4 of the official action, the examiner merely asserts "it would have been obvious for one having ordinary skill in the art to employ the blowing agents of Moore *et al.* in the preparations of Kruecke *et al.* ... in order to arrive at the products and/or

processes of the applicants' claims with the expectation of success." The applicants respectfully disagree.

Contrary to the examiner's allegation, there is no suggestion in Kruecke *et al.* to make this substitution. A person of ordinary skill in the art would not be motivated to use a hydrofluoroether in place of the fluorinated hydrocarbons mentioned in Kruecke *et al.* See M.P.E.P. §2143.01, which explains, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Assuming *arguendo*, an ordinary person of skill in the art would be motivated to combine hydrofluoroethers with HFC 365mfc, he or she would still not be able to select those hydrofluoroethers that could be used to solve the technical problem of the present invention. According to the present invention, only a selected class of hydrofluoroethers of formula (I) (*i.e.*, those giving boiling points from 50°C to 150°C) are suitable for combination with HFC 365mfc in order to solve the technical problem of the present invention. By contrast, Moore *et al.* teach hydrofluoroethers having boiling points as high as 178 to 183°C (see example 29, column 23, line 65) and as low as 40°C (see example 1, column 14, line 66). Thus, a person of ordinary skill in the art would not reasonably expect that combining Kruecke *et al.* with Moore *et al.* could successfully solve the technical problem of the present invention.

Moreover, the applicants submit that Kruecke *et al.* teach away from the present invention. Kruecke *et al.* teach binary compositions wherein both components are blowing agents. But, as illustrated in examples 1 and 2 of the reference (column 4), the binary compositions have only one boiling point. Specifically, examples 1 and 2 demonstrate that by admixing HFC 365 mfc with either R 134a (example 1) or 227ea (example 2), the resulting mixture has one boiling point: 20°C (column 4, line 39) and 23°C (column 4, line 46), respectively. Consequently, a person of ordinary skill in the art would readily understand that the binary compositions taught by Kruecke *et al.* are azeotropic mixtures.

Because a person of ordinary skill in the art would understand that Kruecke *et al.* teach the formation of azeotropic mixtures, it logically follows that Kruecke *et al.* teach away from the non-azeotropic mixtures of the present invention (e.g., see example 8, which illustrates that the fluid mixtures according to claim 1 are not azeotropic or near azeotropic mixtures). The non-azeotropic mixtures of the present invention solve the technical problem of having available mixtures comprising HFC 365mfc, which is used as a substitute of HFC 141b, for obtaining polymeric foams having thermoinsulating properties. In conclusion, the applicants respectfully submit that claims 1 to 13 are not unpatentable over Kruecke *et al.* in view of Moore *et al.*, and request withdrawal of this rejection.

Claims 1 to 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kruecke *et al.* in view of Klug *et al.* (U.S. Pat. No. 5,605,882). The applicants respectfully traverse in view of the preceding claim amendments and succeeding remarks.

Klug *et al.* disclose azeotropic mixtures of hydrofluorocarbons and hydrofluoroethers. By contrast, as discussed above, the present invention is directed toward non-azeotropic fluid mixtures (e.g., see example 8, which illustrates that the fluid mixtures according to claim 1 are not azeotropic or near azeotropic mixtures). A person of ordinary skill in the art, considering Kruecke *et al.* in view of Klug *et al.*, would not be motivated to select non-azeotropic fluid mixtures comprising HFC 365mfc. Furthermore, like Moore *et al.*, Klug *et al.* are silent as to those hydrofluoroethers, which in combination with HFC 365mfc, allows one to solve the technical problem of the present invention. The applicants respectfully submit that claims 1 to 13 are not unpatentable over Kruecke *et al.* in view of Klug *et al.*, and request withdrawal of this rejection.

**III. CONCLUSION**

In view of the amendments and remarks above, the applicants respectfully submit that this application is in condition for allowance and request favorable action thereon.

In the event this response is not timely filed, the applicants hereby petition for an appropriate extension of time. The fee for this extension, along with additional fees required, may be charged to Deposit Account No. 01-2300, referencing Attorney Docket No. 108910-00121.

Respectfully submitted,

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